What is claimed is:

1. An isolated nucleic acid molecule encoding a polypeptide comprising the amino acid sequence of SEQ ID NO:2.

5

2. The isolated nucleic acid molecule of claim 1 that comprises the nucleotide sequence of SEQ ID NO:1.

3. A nucleic acid molecule that is a complement to said isolated nucleic acid molecule

10   of claim 1.

4. A nucleotide sequence that hybridizes under stringent conditions to said complement of claim 3, provided that said nucleotide sequence does not encode human, murine or rat receptor activator of NF-κB ligand polypeptide.

15

5. The isolated nucleic acid molecule of claim 1 that is DNA or RNA.

6. An isolated canine receptor activator of NF-κB ligand comprising the amino acid sequence of SEQ ID NO:2, or a fragment thereof, wherein said fragment binds to a

20   canine receptor activator of NF-κB.

7. The isolated canine receptor activator of NF-κB ligand of claim 6, wherein said fragment is selected from the group consisting of:

    from about residue 10 to about residue 275 of SEQ ID NO:2;

    from about residue 30 to about residue 275 of SEQ ID NO:2;

    from about residue 50 to about residue 275 of SEQ ID NO:2;

    from about residue 150 to about residue 275 of SEQ ID NO:2;

    from about residue 250 to about residue 275 of SEQ ID NO:2;

    from about residue 255 to about residue 275 of SEQ ID NO:2;

    from about residue 235 to about residue 255 of SEQ ID NO:2;

    from about residue 215 to about residue 235 of SEQ ID NO:2;

    from about residue 195 to about residue 215 of SEQ ID NO:2;

from about residue 175 to about residue 195 of SEQ ID NO:2

from about residue 155 to about residue 175 of SEQ ID NO:2;

from about residue 135 to about residue 155 of SEQ ID NO:2;

from about residue 95 to about residue 135 of SEQ ID NO:2;

from about residue 75 to about residue 95 of SEQ ID NO:2;

from about residue 55 to about residue 75 of SEQ ID NO:2;

from about residue 35 to about residue 55 of SEQ ID NO:2;

from about residue 15 to about residue 35 of SEQ ID NO:2;

from about residue 1 to about residue 15 of SEQ ID NO:2;

from about residue 125 to about residue 160 of SEQ ID NO:2;

from about residue 119 to about residue 153 of SEQ ID NO:2;

from about residue 175 to about residue 200 of SEQ ID NO:2;

from about residue 183 to about residue 192 of SEQ ID NO:2;

from about residue 200 to about residue 225 of SEQ ID NO:2;

from about residue 204 to about residue 211 of SEQ ID NO:2;

from about residue 195 to about residue 215 of SEQ ID NO:2;

from about residue 221 to about residue 227 of SEQ ID NO:2;

from about residue 110 to about residue 140 of SEQ ID NO:2; and

any combination thereof.

8. An immunogenic composition that comprises the canine receptor activator of NF-κB ligand of claim 6.

9. The immunogenic composition of claim 8, that further comprises one or more additional elements selected from the group consisting of:

(a) a foreign T helper lymphocyte epitope,

(b) an element that targets the canine receptor activator of NF-κB ligand immunogenic composition to an antigen presenting cell or a B-lymphocyte,

(c) an element that stimulates the immune system, and

(d) an element that optimizes presentation of the canine receptor activator of NF-κB ligand to the immune system.

10.   The immunogenic composition of claim 9, wherein the canine receptor activator of NF-κB ligand is part of a fusion polypeptide.

11. The immunogenic composition of claim 9 that further comprises a duplication of at least one element selected from the group consisting of a receptor activator of NF-κB ligand B-cell epitope, a hapten and a combination thereof.

12. The immunogenic composition of claim 9, wherein said T-cell epitope is immunodominant in a mammal to be treated.

13. The immunogenic composition of claim 9, wherein said foreign T-cell epitope is selected from the group consisting of a natural promiscuous T-cell epitope and an artificial MHC-II binding peptide sequence.

14. The immunogenic composition of claim 13, wherein said natural promiscuous T-cell epitope is selected from the group consisting of a Tetanus toxoid epitope, a diphtheria toxoid epitope, an influenza virus hemagluttinin epitope, and a *P. falciparum* CS epitope.

15. The immunogenic composition of claim 14, wherein said Tetanus toxoid epitope is a Tetanus toxoid P2 epitope or a Tetanus toxoid P30 epitope.

16. The immunogenic composition of claim 9 (b), wherein said targeting element is selected from the group consisting of a substantially specific binding partner for a B-lymphocyte specific surface antigen, an APC specific surface antigen for which there is a receptor on the B-lymphocyte and the APC, and a combination thereof.

17. The immunogenic composition of claim 9(c), wherein said immune system stimulating element is selected from the group consisting of a cytokine, a hormone, and a heat-shock protein.

18. The immunogenic composition of claim 17, wherein the cytokine is selected from the group consisting of interferon *gamma*, Flt3L, interleukin 1, interleukin 2, interleukin

4, interleukin 6, interleukin 12, interleukin 13, interleukin 15, granulocyte-macrophage colony stimulating factor, and an effective fragment thereof: and   wherein, the heat-shock protein is selected from the group consisting of HSP70, HSP90, HSC70, GRP94, calreticulin, and an effective fragment thereof.

19.   The immunogenic composition of claim 9 (d), wherein said immune system presenting element is a lipid selected from the group consisting of a palmitoyl group, a myristyl group, a farnesyl group, a geranyt-geranyl group, a GPI-anchor, and an N-acyl diglyceride group.

20.   The immunogenic composition of claim 9 that comprises

(i) at least two copies of the receptor activator of NF-κB ligand polypeptide or the fragment thereof, or

(ii) a modified receptor activator of NF-κB ligand polypeptide or a modified fragment thereof, wherein the modified receptor activator of NF-κB ligand polypeptide or modified fragment thereof is linked to a carrier molecule.

21.   A vaccine composition comprising an effective amount of the receptor activator of NF-κB ligand immunogenic composition of claim 6, and a pharmaceutically acceptable carrier.

22.   The vaccine composition of claim 21 further comprising a suitable adjuvant.

23.   The vaccine composition of claim 22 wherein the adjuvant facilitates breaking of autotolerance to autoantigens.

24.   The vaccine composition of claim 22 wherein the adjuvant is selected from the group consisting of: Adjuvant 65, Freund's complete or incomplete adjuvant, aluminum hydroxide, aluminum phosphate, alum, hexadecylamine, octadecylamine, lysolecithin, dimethyldioctadecylammonium bromide, N,N-dioctadecyl-N',N'-bis(2-hydroxymethyl) propanediamine, methoxyhexadecylglycerol, pluronic polyols; polyanions, pyran, dextran sulfate, poly IC, polyacrylic acid, carbopol; muramyl dipeptide, dimethylglycine tuftsin, oil emulsions and combinations thereof.

25. An antibody or antibody fragment that selectively binds to the canine receptor activator of NF-κB ligand comprising the amino acid sequence of SEQ ID NO:2.

26. The antibody of claim 25 that is a monoclonal antibody.

27. A method for inhibiting canine receptor activator of NF-κB ligand activity in a mammal, comprising administering to the mammal an amount of the antibody or fragment thereof of claim 25 that is effective to inhibit canine receptor activator of NF-κB ligand activity in the mammal.

28. The method of claim 27 wherein the antibody or fragment thereof is administered at a frequency and for a duration sufficient to maintain bone mass or bone density in the mammal at a level equal to or greater than the bone mass or bone density measured prior to the step of administering the antibody or fragment thereof.

29. A method for inhibiting receptor activator of NF-κB ligand activity in a mammal, comprising administering to the mammal an amount of a receptor activator of NF-κB ligand immunogenic composition of claim 6, that is effective to elicit antibodies that selectively bind to the receptor activator of NF-κB ligand in the mammal.

30. The method of claim 29 wherein the mammal is selected from the group consisting of a canine, an equine, a feline, a bovine, a porcine and a human.

31. A method for treating conditions in a mammal characterized by excess resorption of bone, comprising immunizing a mammal with an effective amount of the canine receptor activator of NF-κB ligand immunogenic composition of claim 6.

32. A nucleic acid molecule comprising an open reading frame encoding the canine receptor activator of the NF-κB ligand immunogenic composition of claim 6.

33. The nucleic acid molecule of claim 32 that is RNA or DNA.

34. A replicable nucleic acid vector comprising the nucleic acid molecule of claim 32.

5   35. The replicable nucleic vector of claim 34 selected from the group consisting of a plasmid, a phage, a cosmid, a mini-chromosome, and a virus.

36. The replicable nucleic vector of claim 34 that is suitable for expression of the vector by a eukaryotic host cell, a prokaryotic host cell, or both.

10

37. The replicable nucleic vector of claim 34, comprising a suitable promotor operably linked 5' to the open reading frame of the canine receptor activator of NF-κB ligand immunogenic composition.

15 38. The replicable nucleic vector of claim 37 further comprising an operably linked nucleic acid sequence encoding a leader peptide enabling secretion or membrane integration of the canine receptor activator of NF-κB ligand immunogenic composition.

39. A host cell comprising the replicable nucleic acid vector of claim 34.

20

40. The host cell of claim 39 that is a microorganism selected from the group consisting of a bacterium, a yeast, and a protozoan.

41. The host cell of claim 39 that is derived from a multicellular organism selected

25 from a fungus, an insect cell, a plant cell, and a mammalian cell.

42. A method of producing a canine receptor activator of NF-κB ligand comprising culturing the host cell of claim 39 under conditions suitable for expressing the canine receptor activator of NF-κB ligand.

30

43. A method for inhibiting receptor activator of NF-κB ligand activity in a mammal, comprising administering to the mammal an amount of a nucleic acid vector of claim 34, wherein the nucleic acid vector is suitable for expressing canine receptor activator

of NF-κB ligand *in vivo* in the mammal, thereby eliciting an immune response effective to inhibit receptor activator of NF-κB ligand activity in the mammal.

44. A stable cell line comprising the vector of claim 34.

45. The stable cell line of claim 44 that secretes a canine receptor activator of NF-κB ligand immunogenic composition or that expresses a canine receptor activator of NF-κB ligand immunogenic composition on its surface.

46. Use of a canine receptor activator of NF-κB ligand immunogenic composition for the preparation of a vaccine comprising an adjuvant for down-regulating RANKL activity in an mammal.

47. Use of a canine receptor activator of NF-κB ligand for the preparation of a vaccine comprising an adjuvant for the treatment, prophylaxis or amelioration of osteoporosis or other conditions characterized by excessive bone resorption.